

Claims

What is claimed is:

1. A method for detecting and mitigating call routing arbitrage, the method comprising:
 - 5 (a) receiving a plurality of signaling messages relating to calls in a telecommunications network;
 - (b) identifying, from the plurality of signaling messages, signaling messages that are candidates for call routing arbitrage screening;
 - (c) from the signaling message identified as candidates for call routing
10 arbitrage screening, examining at least one parameter in the signaling messages to determine the presence of call routing arbitrage; and
 - (d) in response to identifying the presence of call routing arbitrage, performing an arbitrage mitigation action.
- 15 2. The method of claim 1 wherein receiving signaling messages includes receiving SS7 signaling messages and wherein identifying messages as candidates for call routing arbitrage screening includes identifying ISUP IAM messages.
3. The method of claim 1 wherein receiving signaling messages includes
20 receiving SS7 signaling messages encapsulated in IP datagrams and wherein identifying signaling messages as candidates for call routing arbitrage screening includes identifying ISUP IAM messages from the IP-encapsulated SS7 messages.

4. The method of claim 1 wherein receiving signaling messages includes receiving packet telephony signaling messages and wherein identifying signaling messages as candidates for call routing arbitrage screening includes identifying signaling messages used to initiate a packet
5 telephony call or session.
5. The method of claim 1 wherein examining at least one parameter in each of the candidate signaling messages includes examining a calling party identification parameter in each of the signaling messages.
6. The method of claim 1 wherein examining at least one parameter in each
10 of the signaling messages includes examining a jurisdiction informational parameter in each of the signaling messages.
7. The method of claim 1 wherein identifying the presence of call routing arbitrage includes identifying the presence of call routing arbitrage in response to the parameter being set to any value that is outside of a list of
15 recognized values.
8. The method of claim 1 wherein identifying the presence of call routing arbitrage includes identifying the presence of call routing arbitrage in response to the parameter being set to a predetermined value.
9. The method of claim 8 wherein the predetermined value is customizable
20 by a network operator.
10. The method of claim 1 wherein identifying the presence of call routing arbitrage includes identifying signaling messages that are intended to

make long-distance calls appear to a terminating carrier as local calls by routing the calls through local trunk groups of an intermediate carrier.

11. The method of claim 1 wherein performing an arbitration mitigation action includes dropping a call for which call routing arbitrage has been
5 identified.

12. The method of claim 1 wherein performing an arbitrage mitigation action includes redirecting a call for which call routing arbitrage has been identified to an interactive voice response server.

13. The method of claim 12 comprising, at the IVR server, requesting
10 information missing from a call signaling message, and in response to receiving the information, reconstructing the call signaling message, and completing the call using the reconstructed call signaling message.

14. The method of claim 12 comprising, at the IVR server, requesting information missing from a call signaling message and in response to
15 failing to receive the requested information, dropping the call.

15. The method of claim 1 wherein performing an arbitration mitigation action includes obtaining jurisdictional information from a number portability database and using the received jurisdictional information to fill in missing jurisdictional information from a call signaling message for which call
20 routing arbitrage has been identified.

16. The method of claim 1 wherein steps (a)-(d) are performed at a signal transfer point.

17. The method of claim 1 wherein steps (a)-(d) are performed at an SS7/IP gateway.

18. The method of claim 1 wherein steps (a)-(d) are performed at a media gateway controller.

5 19. The method of claim 1 wherein steps (a)-(d) are performed by a stand-alone network monitoring system.

20. A system for identifying and mitigating call routing arbitrage, the system comprising:

10 (a) an arbitrage pre-screening function for receiving signaling messages and for identifying signaling messages as candidates for arbitrage screening;

(b) an arbitrage screening function operatively associated with the arbitrage pre-screening function for receiving the signaling messages identified as candidates for arbitrage screening and for screening the signaling messages based on one or more parameters in the signaling messages to identify the presence of call routing arbitrage; and

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(c) an arbitrage mitigation function operatively associated with the arbitrage screening function for performing an arbitrage mitigation action to mitigate the call routing arbitrage.

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21. The system of claim 20 wherein the arbitrage pre-screening function is adapted to identify the signaling messages as candidates for arbitrage screening based on the message type.

22. The system of claim 21 wherein the arbitrage pre-screening function is adapted to identify ISUP IAM messages as candidates for arbitrage screening.
23. The system of claim 21 wherein the arbitrage pre-screening function is adapted to identify packet telephony initial call setup messages as candidates for arbitrage screening.
24. The system of claim 20 wherein the arbitrage screening function is adapted to examine a calling party parameter in each signaling message to identify the presence of arbitrage call routing.
25. The system of claim 24 wherein the arbitrage screening function is adapted to identify the presence of call routing arbitrage in response to the calling party parameter being set to a predetermined value.
26. The system of claim 25 wherein the predetermined parameter is configurable by a network operator.
27. The system of claim 24 wherein the arbitrage screening function is adapted to identify the presence of call routing arbitrage in response to the calling party parameter being set to any value outside of a predetermined list of recognized values.
28. The system of claim 20 wherein the arbitrage screening function is adapted to identify the presence of call routing arbitrage based on jurisdictional information in each candidate signaling message.

29. The system of claim 28 wherein the arbitrage screening function is adapted to determine the presence of call routing arbitrage in response to the jurisdictional information being set to a predetermined value.
30. The system of claim 29 wherein the predetermine value is configurable by
5 a network operator seeking to detect call routing arbitrage.
31. The system of claim 28 wherein the arbitrage screening function is adapted to identify the presence of call routing arbitrage based on the jurisdictional information being equal to any value that is outside a predetermined list of recognized values.
- 10 32. The system of claim 20 wherein the arbitrage screening function is adapted to identify the presence of call routing arbitrage based on a circuit identification code (CIC) in each candidate signaling message.
33. The system of claim 32 wherein the arbitrage screening function is adapted to determine the presence of call routing arbitrage in response to
15 the CIC being set to a predetermined value.
34. The system of claim 33 wherein the predetermine value is configurable by a network operator seeking to detect call routing arbitrage.
35. The system of claim 32 wherein the arbitrage screening function is adapted to identify the presence of call routing arbitrage based on the CIC
20 being equal to any value that is outside a predetermined list of recognized values.
36. The system of claim 20 wherein the arbitrage mitigation function is adapted to drop each call for which call routing arbitrage is identified.

37. The system of claim 20 wherein the arbitrage mitigation function is adapted to redirect each call for which call routing arbitrage is identified to an interactive voice response (IVR) server.
- 5 38. The system of claim 37 wherein the IVR server is adapted to obtain information missing from call signaling messages associated with calls for which call routing arbitrage has been detected, to insert the missing information in the call signaling messages, and to complete the calls using the modified call signaling messages.
- 10 39. The system of claim 20 wherein the arbitrage prescreening function, the arbitrage screening function, and the arbitrage mitigation function are components of an SS7 signal transfer point.
40. The system of claim 20 wherein the arbitrage prescreening function, the arbitrage screening function, and the arbitrage mitigation function are components of an SS7/IP gateway.
- 15 41. The system of claim 20 wherein the arbitrage prescreening function, the arbitrage screening function, and the arbitrage mitigation function are components of a media gateway controller.
- 20 42. The system of claim 20 wherein the arbitrage prescreening function, the arbitrage screening function, and the arbitrage mitigation function are components of a stand-alone network monitoring system.
43. The system of claim 20 wherein the executed arbitrage prescreening function by a first processor and the arbitrage screening and mitigation

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functions are executed by a second processor separate from the first processor.

44. The system of claim 20 wherein the arbitrage mitigation function is configurable by the network operator.

5 45. The system of claim 44 wherein the arbitrage mitigation function is configurable to perform a first arbitrage mitigation action in response to detection of call routing arbitrage by a first party and to perform a second arbitrage mitigation function in response to call routing arbitrage by a second party.